(54) **Automatic animal feeder**

(57) An autmatic dog feeding machine is characterized by an auto/manual selection switch arrangement 15, 16, to control the mode of action such that while on manual operation it initiates, directly from microprocessor 1 through a drive unit 6, a D.C. motor 7 to rotate; while on automatic operation the input of parameters through keyboard 2 controls the feeding schedule and quantity indicated on LCD display 4, wherein the rotating motor 7 drives a helical screw type feeding structure 18 and at the same time, a signal can be fed back from a microswitch to microprocessor 1 for quantity control. The dog's owner, by pressing a button 13, records a message at 9 via microphone 14 which is relayed to the dog, under control of circuit 8, via speaker 11 to indicate that "dinner is served".
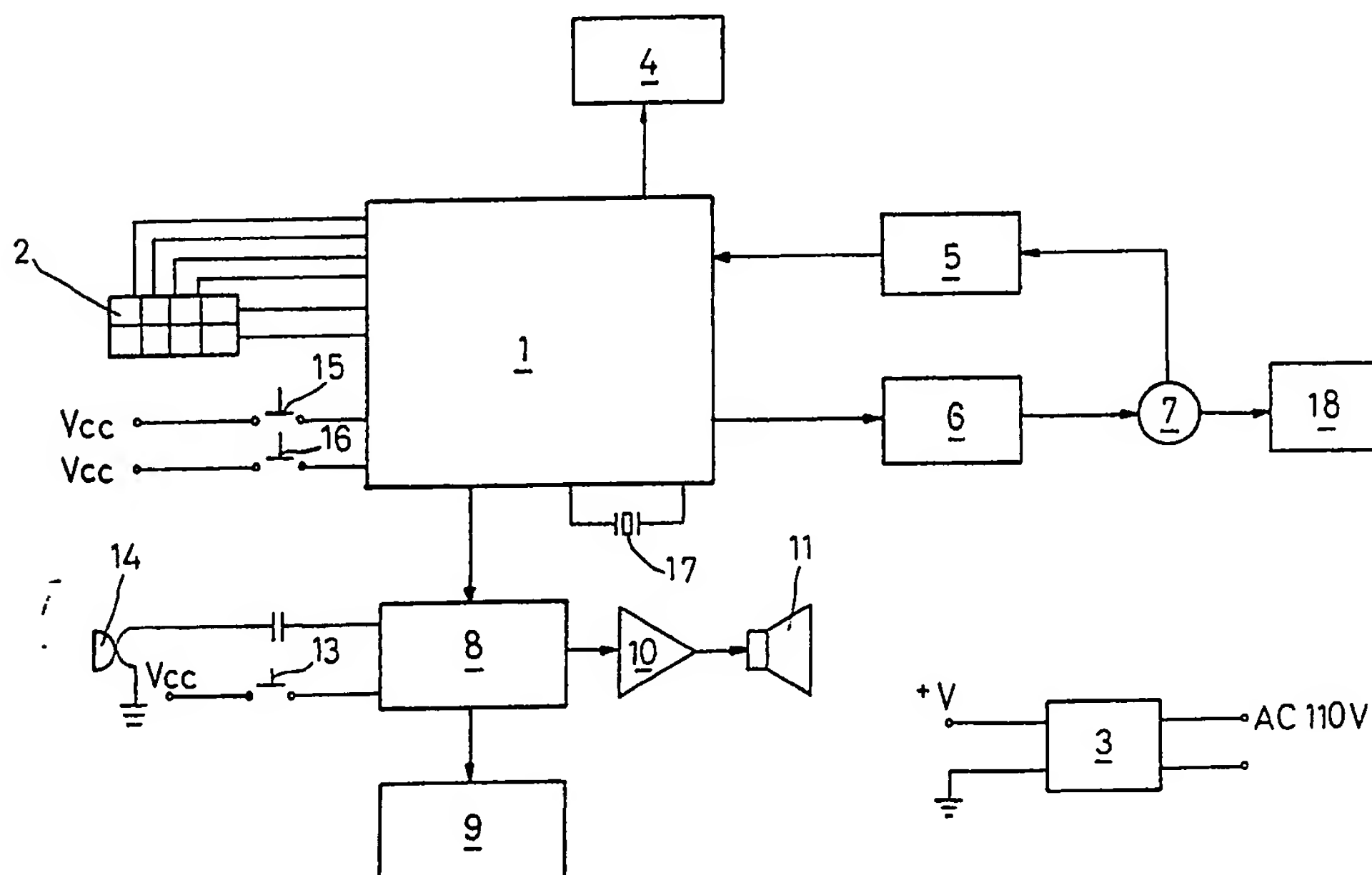

FIG·2

GB 2 214 329 A
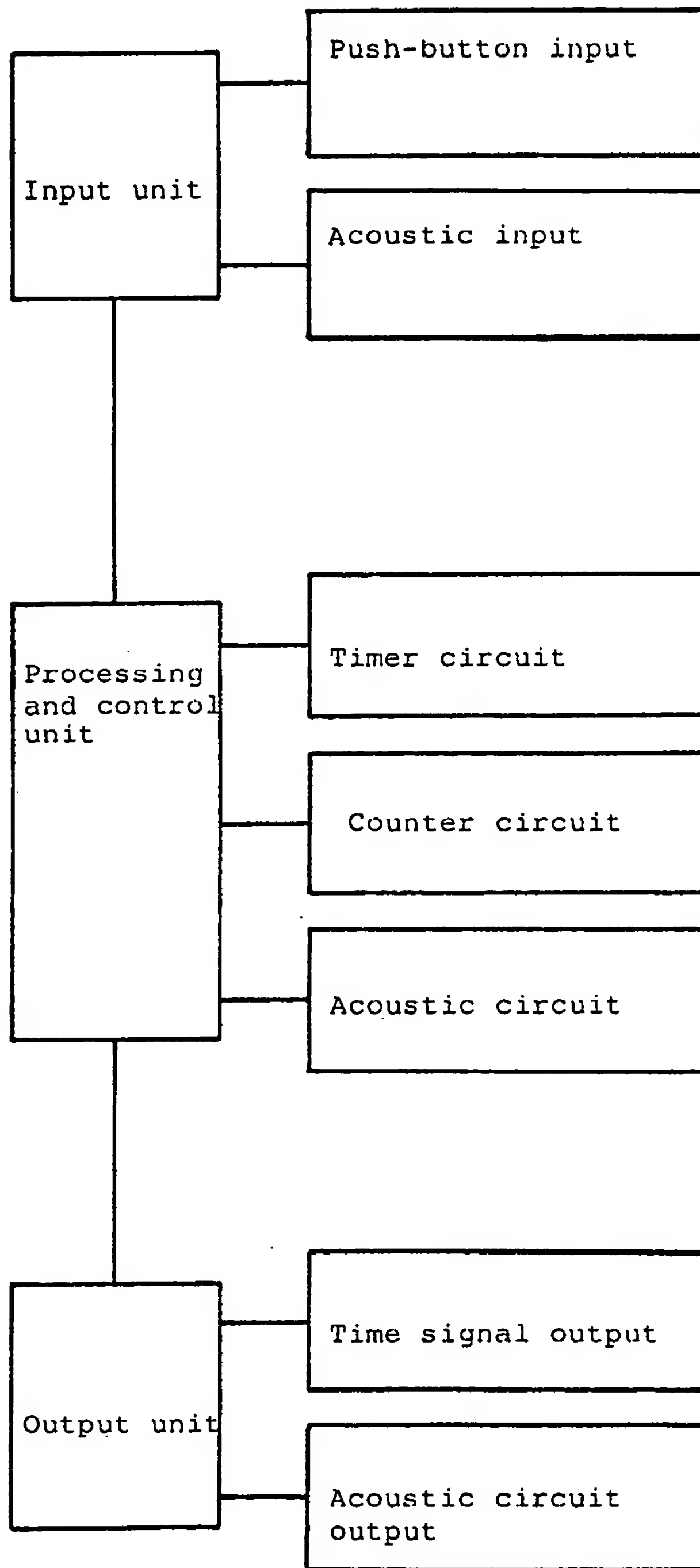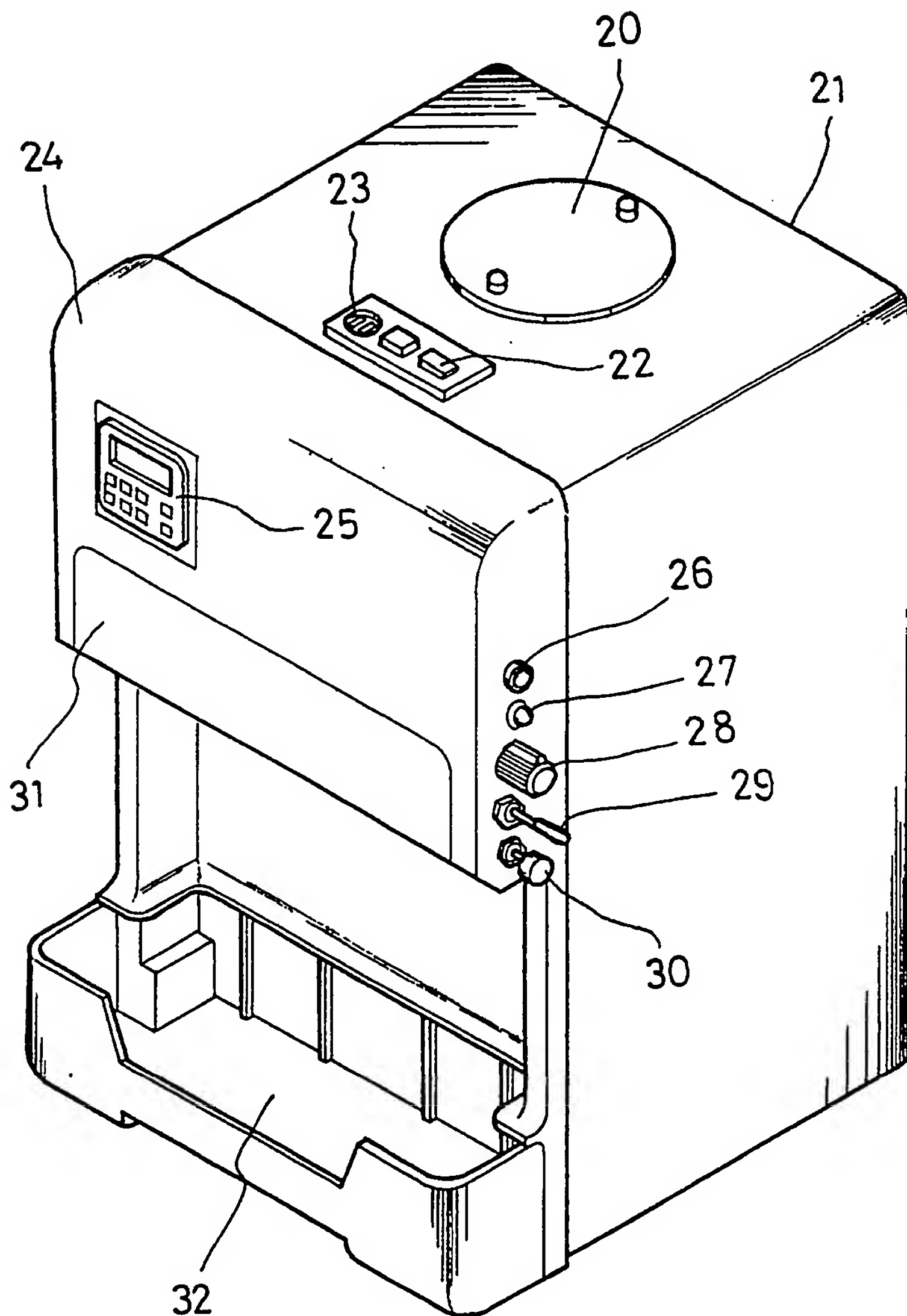
2214329

```
                              ┌─────────────────────┐
                          ┌───│  Push-button input  │
        ┌────────────┐    │   └─────────────────────┘
        │            │────┘
        │ Input unit │
        │            │────┐   ┌─────────────────────┐
        └────────────┘    └───│   Acoustic input    │
              │               └─────────────────────┘
              │
              │
              │                ┌─────────────────────┐
        ┌────────────┐     ┌───│    Timer circuit    │
        │ Processing │─────┘   └─────────────────────┘
        │ and control│
        │ unit       │─────┐   ┌─────────────────────┐
        │            │     ├───│   Counter circuit   │
        │            │     │   └─────────────────────┘
        │            │─────┘
        └────────────┘     │   ┌─────────────────────┐
              │            └───│   Acoustic circuit  │
              │                └─────────────────────┘
              │
              │
        ┌────────────┐         ┌─────────────────────┐
        │            │─────────│  Time signal output │
        │ Output unit│         └─────────────────────┘
        │            │
        │            │─────────┌─────────────────────┐
        └────────────┘         │  Acoustic circuit   │
                               │  output             │
                               └─────────────────────┘
```

F I G. 1

FIG·2

FIG·3

221432

FIG·4

2214329

FIG·5

FIG· 6

2214329

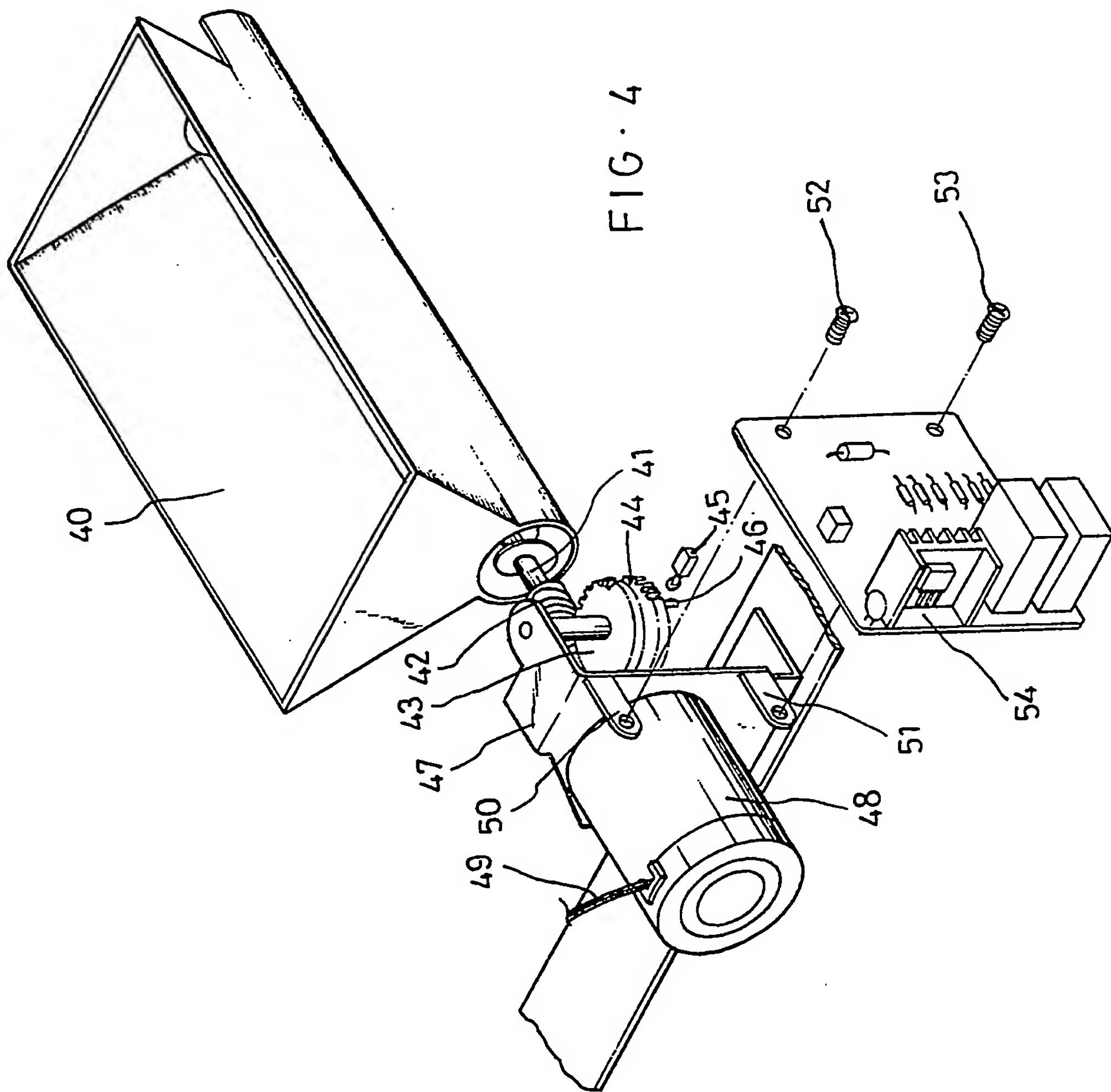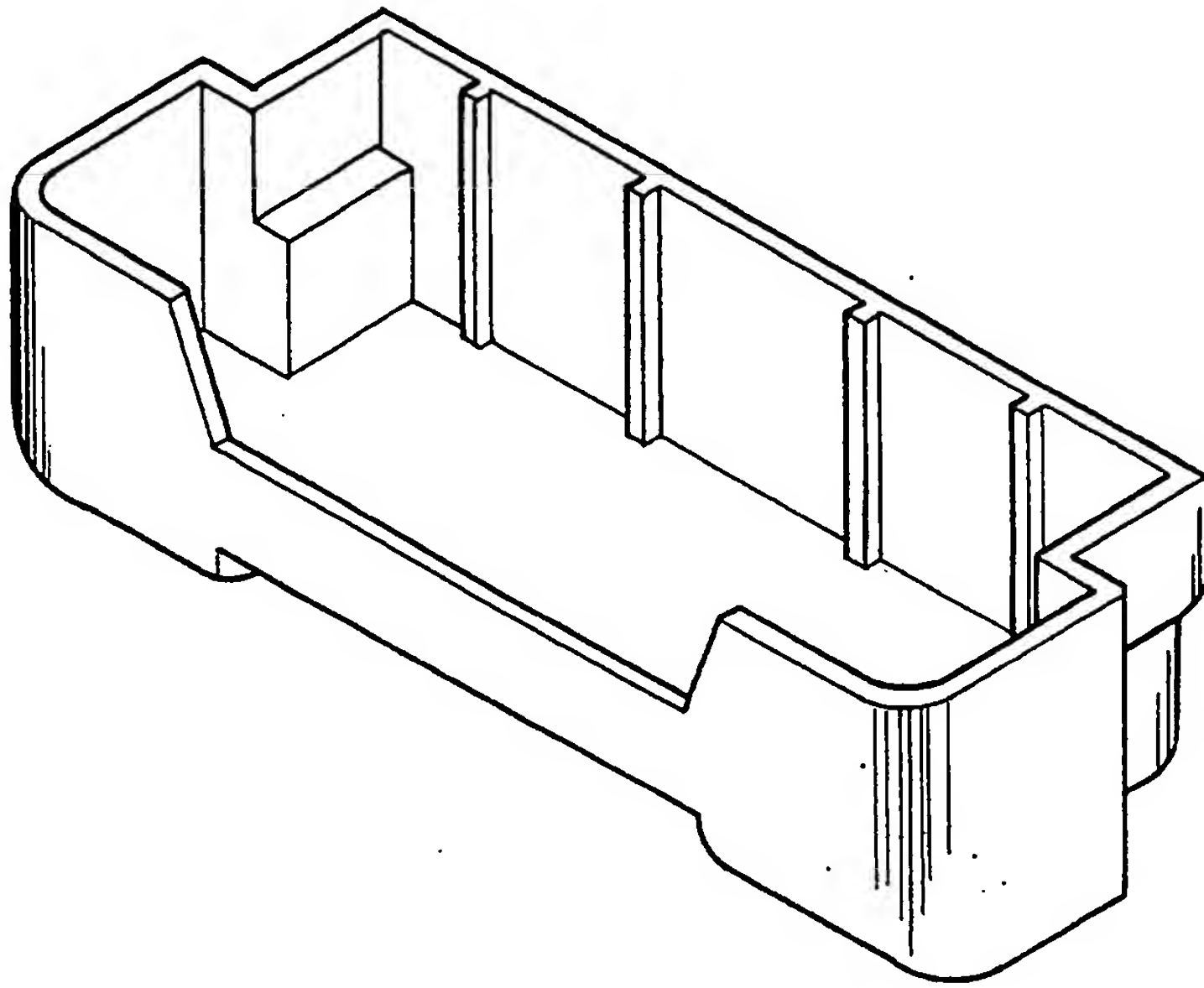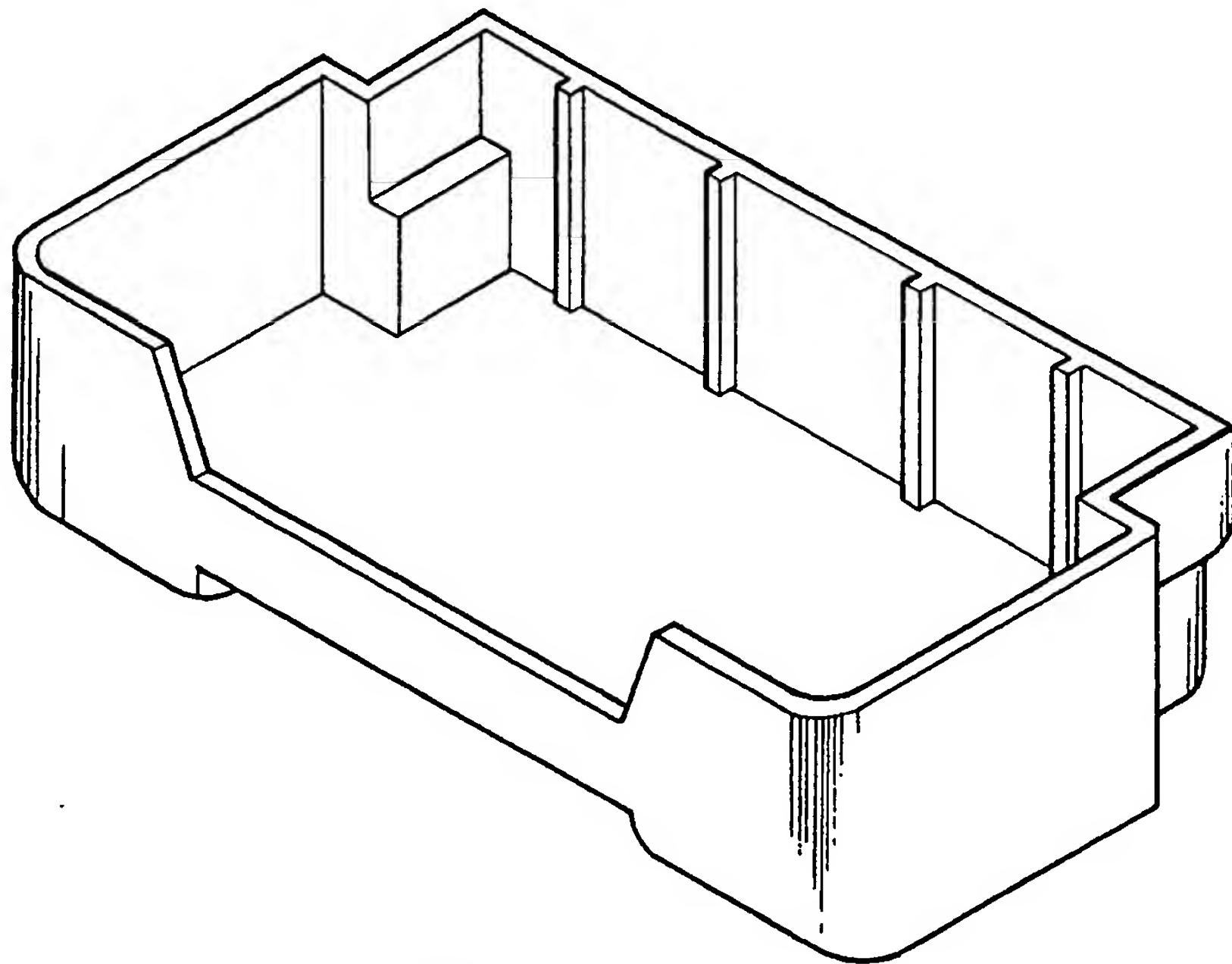## PROGRAMABLE AUTOMATIC DOG FEEDING MACHINE WITH MICROPROCESSOR

This invention relates to PROGRAMABLE AUTOMATIC DOG
5   FEEDING MACHINE WITH MICROPROCESSOR.

Coming after the evolution of social progress
and the increasing of personal income, people enrich
their living activities by breading pets to make
10 pleasures of life.   According to the information of
home life in USA & European countries, more than 65%
of families are greatly pleased in breading pets.
Thus, the nmubers of dog hospitals, beauty-parlors
and the stores for selling animal feeds and the
15 equipments concerned are increasing every day.
Information shows that the families who bread
pets are mainly of the middle and upper cleasses.
They are very care about their leisure life.   On
weekends, they often like to go traveling for recreation.
20 Unless they have servant to stay at home and look after
the house, or the problem of feeding the dog will bother
them.   Some people would pay money to entrust their
neighbors to feed the pets while they are going out.
As for the ordinary families, they would not expect
25 to pay such kind of extraordinary expenditure for all
year round.   Therefore, in recent years, there are
various knids of automatic dog feeding machines been
released, such as Bally's from USA, Setter from West

Germany and some others made in Taiwan. Those dog feeding machines have indeed resolved some of the problems.

Among these products, because of differrent machenical structures and different methods of control, it is difficult for the users to use a feeding machine of big capacity for small dog or one feeding machine of small capacity for big dog. Meanwhile, if the pets have lettle appetite, the feeders can reduce the volume of meals. If feeders wish to increase the volume of meals, it will be limited by the fixed capacity of feeding trough. Furthermore, the feeding schedule for three melas has also been fixed with same interval or so, e.g. for breakfirst at 8:00 AM. lunch at 12:00 AM and dinner at 4:00 PM or 6:00 PM. If dogs are getting sick or under some special conditions, the feeding schedule and the number of meals should be changed. The prevailing dog feeding machines do not allow to make such kind of adjustment. Besides, all the products, either from domestics or abroad and despite of the structure designed or the principle applied, may not be able to attract the pets to take the meal at feeding time, To those dogs who have been moved to a new surroundings or are not accustomed themselves to it, how to attract the pets or can their attention to take the meal is still a problem to be settled.

Up to the present, there is not any product

in the international market can solve all the drawbacks mentioned above. Therefore, a suitable, easy-operated and multi-functional product is highly expected by pets feeders. The present invention of a push-button style, micro-processor controlled, automatic dog feeding machine is creased to meet the requirement.

The present invention comprises a control system matching with an intergrated circuit of sound generating unit, which control system comprises a timer based on micro-processor and a counter based on intergrated circuit.

The main purpose of the present invention is to provide users with a practicable and automatic feeding machine for feeding dogs of different size, species or eccentric behavior or strange hobbies, which is adjustable, according to requirements and by means of push-buttons, in feeding schedule, in the volume of each meal and in the number of meals.

The other purpose of the present invention is to provide an automatic feeding machine which can call the name of the dog at feeding time, while no body is at home, so as to attract the dog come to take, the meal.

An embodiment of this invention is described by way of examples, with reference to the drawings in which :

Fig. 1 is a block diagram of the principle of the scheme of the present invention.

Fig. 2 is the control circuit diagram of the present invention.

5 Fig. 3 is a front view of the structure of the present invention.

Fig. 4 is a perspective view of an automatic feeding machine embodying the present invention.

Fig. 5 is small feeding trough for the present

10 invention.

Fig. 6 is a big feeding trough for the present invention.

According to the block diagram of the

15 principle of the scheme of the present invention as shown in Fig. 1, it consists of the following three parts :

1. Input unit :

It comprises two sections, one is push-button

20 input and the other is acoustic input. The push-button input is operated by hand to press the buttons so as to input to the processing and control unit the data of number of meals, daily feeding schedule, and the quantity of each meal. The acoustic input

25 is to let the processing and control unit memorize the speach that the user said to the acoustic input, for example, the name of he dog, etc.

2. Processing and control unit :

It comprises a timer circuit of microprocessor, a counter circuit of counting I.C., and an acoustic circuit of speach I.C., wherein the timer circuit shows on LCD the data inout through push-buttons

5 for reference and for memory setting; counter circuit counts the number of rotation that the propulsive feeding unit revolved which determines the quantity to be feeded; the acoustic circuit memorizes the input speach for output.

10 3. Output unit :

The output unit of the present invention also comprises two sections; one is for time signal output and the other is for acoustic signal output. The time signal at fixed time gives an electronic

15 signal to drive the screw type propulsive feeding unit to rotate till the fixed number of turns (fixed quantity of meal), wherein the counter circuit counts one while the propulsive feeding unit rotate for one turn.

20 The acoustic signal output is to generate a speach that acoustic circuit memorized so as to call the dog come to take the meal while feeding operation is completed by the compulsive feeding unit.

25 Please refer to the control circuit diagram of the present invention as shown in fig. 2. The main processing unit 1 controls the execution of all the modes, which unit receives a working voltage from power

supply unit; the variable of time, the number of rotations and the fixed quantity of meals from keyboard 2. The disply 4 shows by LCD the time, the number of rotations and the fixed quantity. The main process-

5   ing unit comprised two separate output system. One runs through the drive unit 6 of electronic relay to initiate D.C. motor 7 so as to drive the screw type propulsive feeding unit 18. the micro-switch that fixed inside the D.C. motor picks up the signal of

10 the number of rotations of the propulsive feeding unit 18 so that the fixed quantity of meals can be achieved. The feeding signal is sent to an anti-trip circuit 5 to prevent tri-out of switch signal. The other output system of the main processing unit gives a signal to con-

15 trol acoustic circuit 8.

While the recording button 13 of the acoustic circuit 8 is pressed, the audio signal is stored at the memory unit 9 via microphone 14. When the pressed recording button 13 is pressed back, the main processing

20 unit 1 gives a signal to initiate acoustic circuit 8 output an audio signal to speaker 11 via amplifier 10. As soon as the output of audio signal isfinalized, the acoustic circuit 8 remains at a waiting status for main processing unit 1 to initiate next repetitive

25 operation.

The input of keyboard comprises 8 button keys. They are 'CLK", "HOUR", "MINUTE", "TIMER", "MEALS", "-", "-", and "LAN". The operation procedure

of each button key is respectively described hereinafter:

1. The button-key of "CLK":

The key firstly pressed is for setting the present actual time. For the adjustment of time, minute is a minimum unit. When the key of "CLK" is secondarily pressed, the display shows "SV" which indicates a programmable time.

2. The button-key of "HOUR":

When the key is pressed, the unit of hour increases. The unit of hour increases 1 to 1 in direct proportion to the number of times that the key is pressed.

3. The button-key of "MINUTE":

When the key is pressed, the unit of minute increases. One press each time makes the unit of minute increases one number. If keep pressing the button key uninterrupted, the number of the unit of minute repidly increase for quick adjustment.

4. The button-key of "TIMER":

When the key is pressed, the display shows either "ON" or "OFF". If "ON" is displayed, it means that when fixed time is reached a "signal of action" will be given. if "OFF" is displayed, it means that when the time of action is over a "ignal of action finalized" will be given.

5. The button-key of "MEALS":

This button-key is for setting the number of daily meals. When the key is pressed it turns to the

next number. For example, first press shows 1, second press shows 2, third press shows 3 ... and so on. The maximum number is 6, i.e. six meals maximum a day. If to feed three times a day, input the time for the first, second and third meals and leave the time in blank for the fourth, fifth and sixth means.

6. The button-keys of "+" and "-" :

If press the button-key of "+", it makes the number of the units place, tens place and hundres place of the counter increase automatically for one number. One press each time increases one number. In reverse, if press the button-key of "-", it makes the number of units place, tens place and hundreds place of the counter reduce automatically for one number. The keys "+" and "-" are for setting the quantity of meals, e.f., if fixed number is 25, the screw type propulsive feeding unit will rotate for 25 turns so as to supply a meal for a quantity of 25 turns.

7. The button-key of "LAN":

This button-key is for recording the speach.

In addition to the button-keys above-mentioned, there are two separate switch keys for selecting manual or automatic operation. Each time the key of manual 15 is pressed, it will make an output of a signal of action and will need not to wait for the fixed time. This design is very practica-

ble to those trial users. When the key of auto 16 is pressed, the manual operation will be turned to automatical operation and the signal of action can be output only if the fixed time is reached, i.e.

5   meals will be supplied at fixed time.

According to the front view of the structure of the present invention as shown in FIG. 3, the housing 21 comprises superiorly a power switch 22, a power indicating lamp 23, and a cover plate 24

10   whereinto the meals is filled, and anteriorly a front cover 24 which comprises a control panel 25 for inputing the data required by pressing the button-keys on the panel so as to control the action of the present invention. On lateral of the front cover

15   24, there is one microphone 26, one indicating lamp of recording 27, one voice volume controller 28, one auto/manual selection switch 29and one recording purh-button 30. when the recording push-button 30 is pressed, the recording lamp of recording 27 is

20   lightened and the audio signal is input through microphone 26 to the memory unit of the main processing unit. When auto/manual selection switch is set on manual, the unit of the preferred embodiment can be used for operational test. When it is set on

25   auto, all the action will be controlled by micro-processing controller. meanwhile, the meals are dropped from feeding hole 31 to feeding trough 32 for dogs to eat, which feeding trough is replaceable

with either a small feeding trough (FIG. 5) or a big feeding trough (FIG. 6), according to the appetite and size of the dogs.

5   Please refer to Fig. 4, which is a perspective view of the preferred embodiment, where meals are placed onto the collector 40. When the D.C. motor is initiated, it drives the spiral gear 43 to rotate the spiral bar 42 and the attached propulsive feeding unit 41 so as to supply the meal

10   to the feeding trough. In order to detect the quantity of meal supplied, a micro-switch 45 is attached. When the convex needle 46 rotate for one turn, it makes the micro-switch 45 to close one time, and which signal is then transmitted to microprocessor

15   for counting so as to figure out and control the quantity of meal supplied. The circuit board 54 is firmly fixed to the screw nuts 50 51 of the gear hub 47 by screw bolts 52 53.

To sum up, the present invention provides

20   a practicable push-button style, micro-processor controlled, automatic dog feeding machine which allows to set, through button-keys, daily number of meals, the time interval among meals, and the quantity of each meal to be supplied.

25   Besides, it can record the voice of the host so as to call the dogs to take the meal at feeding time. Furtheremore, the spiral type of propulsive feeding unit is also a fantastic design to supply the meals precisely.

CLAIM:

Programable automatic dog feeding machine
with microprocessor comprising

5   a control unit of microprocessor, which
comprises a microprocessor, an input keyboard, a
LCD display, a motor driven unit, an acoustic circuit
and an auto/manual selection switch;

          a D.C. motor, which is controlled by an
10 output signal from microprocessor via motor driven
unit, wherein a feed-back signal is given from
reducing gear to microprocessor for quantity control;

          a spiral type meal feeding structure,
wherein the rotating D.C. motor drives the spiral
15 gear to turn the spiral bar so as to let the spiral
type meal feeding unit supply the meal from meal
collector to feeding trough.

          a housing, which comprises superiorly a
meal supplying hole, a power switch and a power in-
20 dicating lamp; anteriorly a control panel; laterally
a control switch, and which also comprises inside
a meal collector, a motor, and a spiral type meal
feeding structure;

          It is characterized in an auto/manual
25 selection switch for controlling the mode of actions
in such a manner that while on manual operation,
from the microprocessor through motor driven unit,
it directly initiates the D.C. motor to rotate; While

on automatic operation, the required variables of time and quantity input through keyboard control all the operation, wherein the rotating motor drives a spiral gear to rotate the spiral bar which is

5   then driving the spiral type coaxial meal feeding structure to rotate so as to transport the meal of the collector to a feeding trough; wherefrom a feed-back signal is sent by a microswitch to microprocessor for controlling the quantity of meal;

10   which also characterized in that one of the output terminals of the microprocessor controls the opening and closing of the acoustic circuit.